AAAA

#10 $1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!}$

$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$

$\sin x = \frac{x}{1!} - \frac{x^3}{3!} + \frac{x^5}{5!} - \dots$

$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots$

$e^{-x} = 1 - \frac{x}{1!} + \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} \dots$

22

| x | f | f' |
|---|---|---|
| 0 | 2 | 5 |
| 4 | -3 | 11 |

$$\int_0^4 f(x)\,dx = 8$$

$$\int_0^4 x f'(x)\,dx = x f(x)\Big|_0^4 - \int_0^4 f(x)\,dx$$

| u | dv |
|---|---|
| + x | f' |
| − 1 | f |
| + 0 | $\int f(x)\,dx$ |

$$= -12 - 8 = -20$$

(24) $\frac{dA}{dt} = 2\frac{dC}{dt}$

$A = \pi r^2$ $\qquad$ $C = 2\pi r$

$\frac{dA}{dt} = 2\pi r \frac{dr}{dt}$ $\qquad$ $\frac{dC}{dt} = 2\pi \frac{dr}{dt}$

$2\pi r \frac{dr}{dt} = 4\pi \frac{dr}{dt}$

$r = 2$

(25) $$\int_0^1 \frac{1}{x}\,dx = \lim_{a\to 0^+} \int_a^1 \frac{1}{x}\,dx$$

$$= \lim_{a\to 0^+} \ln x \Big|_a^1$$

$$= \lim_{a\to 0^+} (0 - \ln a)$$

$$= -(-\infty) = \infty$$

# Review quiz 15

#31 $f(x) = (3x)^{(3x)}$

$y = (3x)^{(3x)}$

$\ln y = \ln (3x)^{(3x)}$

$\ln y = (3x)\ln(3x)$

$\frac{1}{y}\frac{dy}{dx} = 3\ln(3x) + \cancel{3x}\cdot\frac{3}{\cancel{3x}}$

$\frac{dy}{dx} = \left[3\ln(3x) + 3\right]\cdot y$

$y = (3x)^{(3x)}$

RvW Qz #10

(20) $\int_0^{\frac{\pi}{2}} \sin(2x) e^{\sin^2 x} \, dx$

$u = \sin^2 x$

$du = 2\sin x \cos x \, dx$

$\int_0^{\frac{\pi}{2}} 2\sin x \cos x \, e^{\sin^2 x} \, dx$

$= \int_0^1 e^u \, du = e^u \Big|_0^1 = e^1 - e^0$

$= e^1 - 1$

# Rvw Qz #7

(42) $\frac{dV}{dt} = kV$

$V(0) = 8$

$V(5) = 12$

$V(12) = ?$

$\int \frac{1}{V} dV = \int k\, dt$

$\ln V = kt + C$

$V = e^{kt+C} = Ae^{kt}$

$8 = Ae^0 = A$

$V = 8e^{kt}$

$12 = 8e^{5k}$

$\frac{3}{2} = e^{5k}$

$k = \frac{\ln \frac{3}{2}}{5}$

$V = 8e^{\frac{1}{5}\ln\frac{3}{2} \cdot t}$

$V(12) \approx 21.169$

# Rv Quiz #16

(14) $\int x \sin(2x)\, dx$

| | u | dv |
|---|---|---|
| + | $x$ | $\sin(2x)$ |
| − | $1$ | $-\frac{1}{2}\cos(2x)$ |
| + | $0$ | $-\frac{1}{4}\sin(2x)$ |

$$= -\frac{1}{2}x\cos(2x) + \frac{1}{4}\sin(2x) + C$$

Rv Qz 16

(15) $f(x) = \dfrac{x^2+5x-24}{x^2+10x+16}$

$\lim_{x \to -8} f(x) =$

$\lim_{x \to -8} \dfrac{(x+8)(x-3)}{(x+8)(x+2)}$

$= \dfrac{-11}{-6} = \dfrac{11}{6}$

Rv Qz 16

#1 $x^2 + 2xy + 3y^2 = 2$

slope when $y = 1$

$x^2 + 2x + 3 = 2$

$x^2 + 2x + 1 = 0$

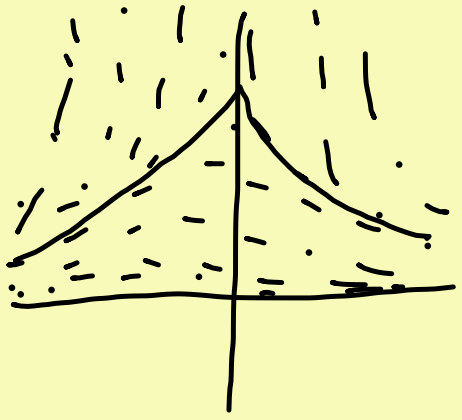
$x = -1$

$2x + 2y + 2x\frac{dy}{dx} + 6y\frac{dy}{dx} = 0$

$(-1,1): -2 + 2 - 2\frac{dy}{dx} + 6\frac{dy}{dx} = 0$

$\frac{dy}{dx} = 0$

AAAA
#15



$y = \cos x$

$y = 1 - x^2$

$y = e^x$

$y = \sqrt{1 - x^2}$

$y = \frac{1}{1 + x^2}$

# 2011 FR #6

$$f(x) = \sin(x^2) + \cos x$$

a) first 4 terms of $\sin x$: $x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!}$

first 4 terms of $\sin(x^2)$: $x^2 - \frac{x^6}{3!} + \frac{x^{10}}{5!} - \frac{x^{14}}{7!}$

$5! = 5! \cdot 6$

b) first 4 terms of $\cos x$: $1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!}$

first 4 terms of $f(x)$: $1 + \frac{1}{2}x^2 + \frac{x^4}{4!} - \frac{121x^6}{6!}$

c) $f^{(6)}(0) = -121$

d) $\left| P_4\left(\frac{1}{4}\right) - f\left(\frac{1}{4}\right) \right| < \frac{1}{3000}$

$$\text{Error} \le \frac{\max\left|f^5(z)\right|}{5!} \cdot x^5$$

$$\frac{40}{120} \cdot \frac{1}{4 \cdot 4 \cdot 4 \cdot 4 \cdot 4} = \frac{1}{3072} < \frac{1}{3000}$$

AAA (8)

| x | 0 | 2 | 4 | 6 |
|---|---|---|---|---|
| f | 4 | k | 8 | 12 |

trap: $\frac{1}{2}\left[2(4+k)+2(k+8)+2(8+12)\right]$

$= 52$

$$\frac{d}{dx} x^x = ?$$

$$y = x^x$$

$$\ln y = \ln x^x$$

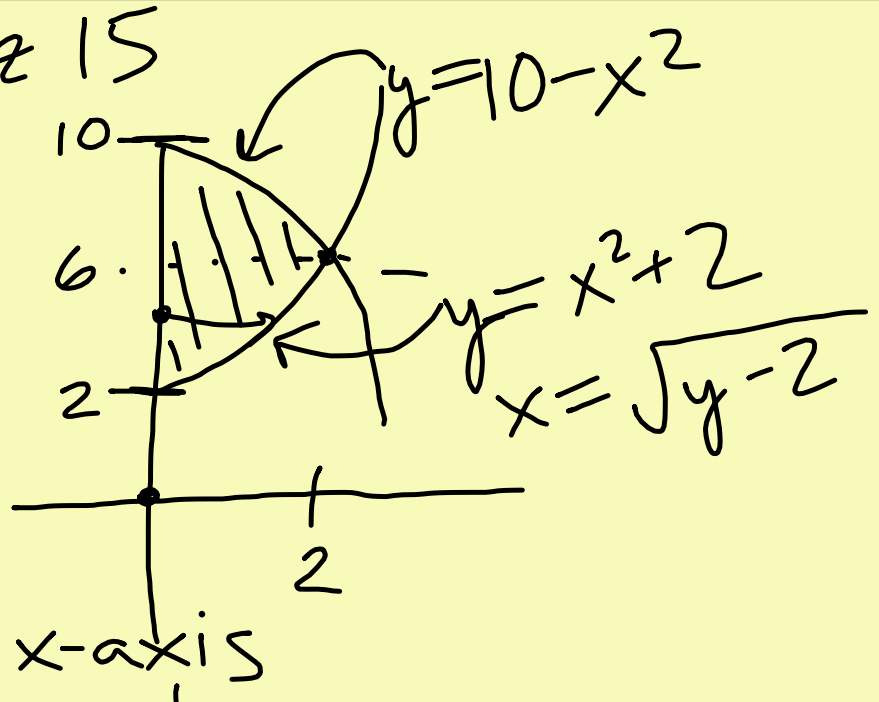
$$\ln y = x \ln x$$

$$\frac{1}{y} \frac{dy}{dx} = \ln x + x \cdot \frac{1}{x}$$

$$\frac{dy}{dx} = (\ln x + 1) \cdot y^x$$

Rvw Qz 15

(39)




about x-axis

$$V = 2\pi \int_a^b r\,h$$

$$V = 2\pi \int_2^6 y\sqrt{y-2}\,dy + 2\pi \int_6^{10} y\sqrt{10-y}\,dy$$

RwQz 15

(38) $f(x) = \sum_{k=1}^{\infty} (\cos^2 x)^k$

$f\left(\frac{\pi}{4}\right) = ?$

$$f\left(\frac{\pi}{4}\right) = \sum_{k=1}^{\infty} \left(\frac{1}{2}\right)^k = \sum_{k=0}^{\infty} \frac{1}{2}\left(\frac{1}{2}\right)^k$$

$$= \frac{\frac{1}{2}}{1-\frac{1}{2}} = 1$$

Newton

$x = \sqrt{11}$

$x^2 = 11$

$x^2 - 11 = 0$

$y = x^2 - 11 \qquad x = 3$

$y' = 2x$

$(3, -2) \quad m = 6$

$y + 2 = 6(x - 3)$

$2 = 6(x - 3)$

$x = \frac{10}{3}$

$\left(\frac{10}{3}, \frac{1}{9}\right) m = \frac{20}{3}$

$y - \frac{1}{9} = \frac{20}{3}\left(x - \frac{10}{3}\right)$

$-\frac{1}{9} = \frac{20}{3}\left(x - \frac{10}{3}\right)$

$x = \_\_\_\_$

$$\text{displacement} = \int_a^b v(t)\,dt$$

$$\langle x'(t),\ y'(t) \rangle$$

$$\text{horiz disp} = \int_a^b x'(t)\,dt$$

$v(0) = 50$

~~$v(t) = 50$~~

$y(t) = -5t^2 + 50t + k$

$y(0) = 100$

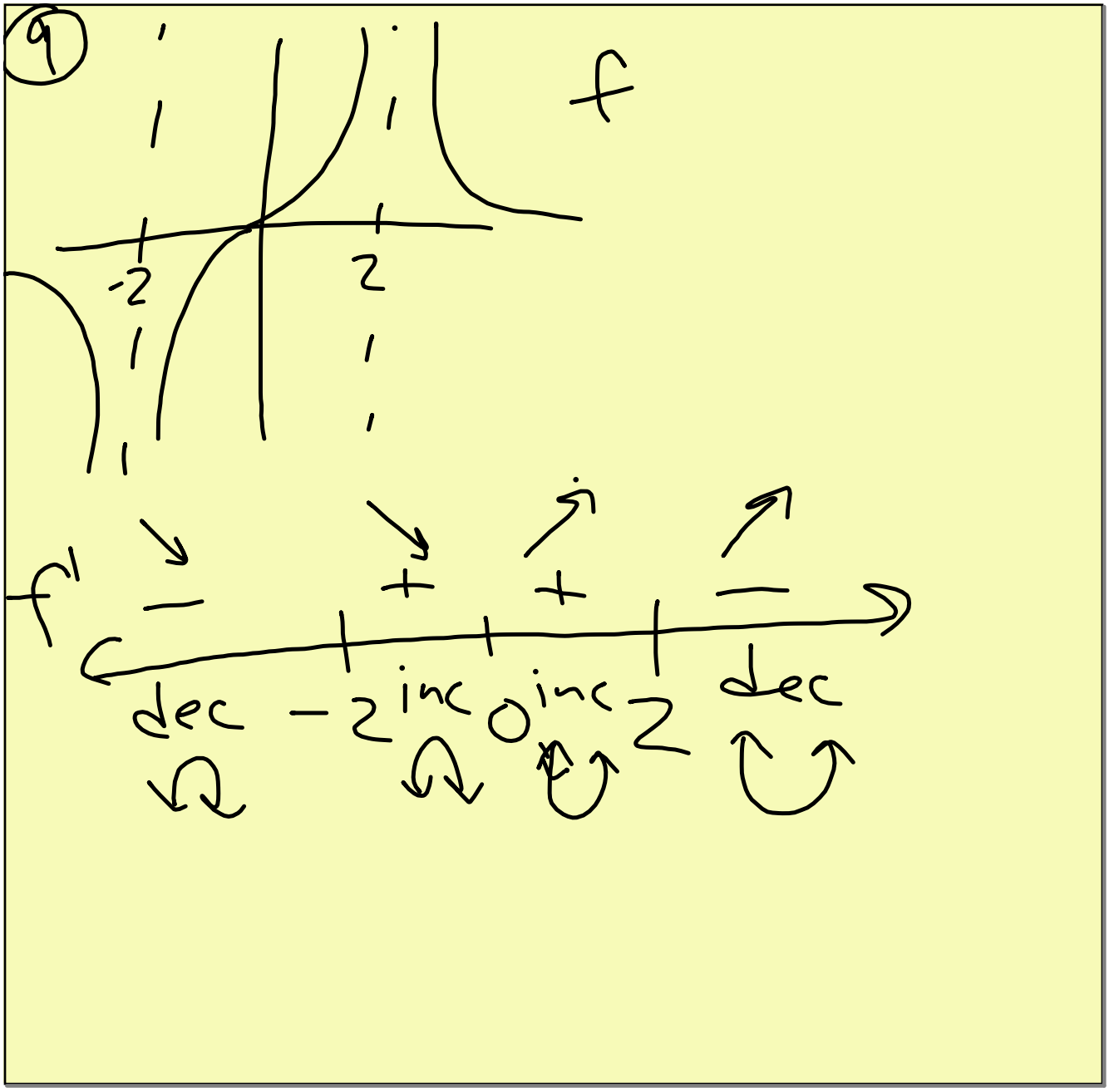
$y(t) = -5t^2 + 50t + 100$

$a(t) = -10$

$v(t) = -10t + C$

$v(t) = -10t + 50 = 0$

$t = 5$


9
f
-2
2
f'
−
+
+
−
dec
−2
inc
0
inc
2
dec