

Ex 2 #13-

a) Find profit

for $x=50$

$$p(50)$$

$$= 1750 \cdot 50$$

$$- 5 \cdot 50^2 - 48000$$

$$= 27,000$$

(b) Find the vertex

$$p(x) = -5x^2 + 1750x - 48000$$

$$= -5(x^2 - 350x + 175^2)$$

$$+ 5 \cdot 175^2 - 48000$$

$$= -5(x - 175)^2 + 105,125$$

Vertex is $(175, 105,125)$

Maximum profit is
\$105,125.

(c) Solve $p(x) = 0$

$$0 = -5(x - 175)^2$$

$$+ 105,125$$

$$(x-175)^2 = \frac{1805125}{5}$$

$$x-175 = \pm \sqrt{20025}$$

$$= \pm 145$$

~~$$x = 175 \pm 145$$~~

$$x = 175 \pm 145$$

$$= 320 \text{ or } 30$$

The company loses money
at 320 packages.

- Completing the square
- Solving quadratics
- Finding vertex.
- Interpreting a graph.

#16 a) $f(x) = \frac{2x^2 + 4x - 6}{x^2 - 1}$

x-intercepts -

Set $y = 0$

Solve $f(x) = 0$

~~$$f(x) = 2(x^2 + 4x - 6)$$~~

$$f(x) = \frac{2(x^2 + 2x - 3)}{x^2 - 1}$$

$$= 2 \frac{(x+3)(x-1)}{(x-1)(x+1)}$$

$$f(x) = 0 \text{ if } x = -3$$

$x = 1$? $f(1)$ is undefined
(Don't divide by zero)

x-intercept at $x = -3$

(b) y. intercept.

means $x = 0$

$$f(0) = -6/-1 = +6$$

(c) Vert. asymptote of

~~Denominator~~
~~Numerator~~ $\neq 0$ b

~~Numerator~~
~~Denom.~~ is not 0.

$$\underline{x = -1}$$

(d) Horizontal asymptote -

For x large

$$f(x) \approx \frac{2x^2}{x^2} = 2$$

$$y = 2$$

At $x=1$

$f(x)$ is undefined,
by reason $x=1$,

$$f(x) = \frac{2(x+3)}{x+1}$$

So $f(x)$ is close to

$$\frac{2 \cdot 4}{2} = 4$$

Value at $(1, 4)$.

-Features of a graph -
a) - e).

Ex 3 #13

(a) 333

(b) Find $P(e) = P \cdot e^{kt}$.

$$P(0) = 111$$

$$P(4) = 333.$$

$$P(0) = P \cdot e^0 = \underline{P = 111}$$

$$P(4) = 333$$

$$111 \cdot e^{k \cdot 4} = 333$$

$$e^{4k} = 3$$

Use inverse of e^x

$$\ln(e^{4k}) = \ln(3)$$

$$4k = \ln(3)$$

$$k = \frac{1}{4} \ln(3).$$

$$\approx 0.2747.$$

(c) Pop. on 15 Jan. 1955

$$\text{is } P(5)$$

$$= 111 \cdot e^{5k}$$

$$\approx 438.$$

(d) Solve $P(T) = 1000$, for T

$$111 \cdot e^{kT} = 1000$$

$$e^{kT} = \frac{1000}{111}$$

$$\ln(e^{kT}) = \ln\left(\frac{1000}{111}\right).$$

$$kT = \ln\left(\frac{1000}{11}\right)$$

$$T = \frac{1}{k} \ln\left(\frac{1000}{11}\right).$$

$$\approx 8.00...$$

1958 is when

0 remainder 1000.

$$\cos(x) = \frac{\sqrt{5}}{5}, \quad \sin(x) > 0$$

$$\sin(y) = \frac{2\sqrt{5}}{5}, \quad \cos(y) < 0$$

Find $\sin(x+y)$.

$$\cos^2(x) + \sin^2(x) = 1$$

Find $\sin(x)$.

$$\cos^2(x) + \sin^2(x) = 1$$

$$\sin(x) = \pm \sqrt{1 - \cos^2(x)}$$

$\equiv$

$$= \pm \sqrt{1 - \left(\frac{\sqrt{5}}{5}\right)^2}$$

$$= \frac{2\sqrt{5}}{5}$$

$$\sin(y) = -1$$

$$\cos(y) = -\sqrt{1 - \sin^2(y)}$$

≡

$$= -\sqrt{5}/5.$$

Now

$$\cos(x+y) =$$

$$\cos(x)\cos(y) - \sin(x)\sin(y)$$

$$= \frac{\sqrt{5}}{5} \left(-\frac{\sqrt{5}}{5} \right) - \frac{2\sqrt{5}}{5} \cdot \frac{2\sqrt{5}}{5}$$

$$= -1.$$

M 10-11 in Mathshaker