Math 344

Q's

$$\begin{cases} 4xy = 4\lambda x \\ 2x^2 = 8\lambda y \end{cases} \longrightarrow x \neq 0$$

$$2x^2 = 8\lambda^2$$

$$x^2 = (2\lambda)^2$$

$$x = 2\lambda$$

$$y = \lambda$$

$\Big\}$ $(\pm 2, \pm 1)$

$x = 0$

$$2x^2 + 4y^2 = 12$$

$$y = \pm\sqrt{3} \qquad (0, \pm\sqrt{3})$$

$$\begin{cases} \nabla f = \lambda \nabla g \\ 2x^2 + 4y^2 = 12 \end{cases}$$

$$\begin{cases} 4xy = 4\lambda x \\ 2x^2 = 8\lambda y \\ 2x^2 + 4y^2 = 12 \end{cases}$$

Solve.

(1) $x \neq 0$

eq^n #1 $\Rightarrow y = \frac{\lambda}{2}$ $\longrightarrow$

$$\begin{cases} 2x^2 = 8\lambda^2 \\ 2x^2 + 4\lambda^2 = 12 \end{cases}$$

$(2, 1)$ $\lambda = 1$

$(-2, 1)$ $\lambda = 1$

$(2, -1)$ $\lambda = -1$

$(-2, -1)$ $\lambda = -1$

(c) $\lambda = 0$ $\begin{cases} 8\lambda y = 0 & \lambda = 0 \\ 4y^2 = 12 \rightarrow & y^2 = 3 \end{cases}$

$y = \pm\sqrt{3}$

$(0, \sqrt{3})$ $\lambda = 0$

$(0, -\sqrt{3})$ $\lambda = 0$

Exam 1 — 10 probs (+) 1 extra credit

10.7 $\vec{r}(t) = \langle \quad \rangle$

a) limit
b) derivative
c) Integral

$\vec{r} : \mathbb{R} \rightarrow$ (set of vectors)

(1 prob) a) $\frac{d}{dt}[\vec{r}]$

b) $\int \vec{r}\, dt = \langle \int f, \int g, \int h \rangle$

one will use Int. by parts.

10.8
10.9 } Apps ① Arc length
② eqn's of motion

11.1 Introduced $z = f(x,y)$, $w = f(x,y,z)$

(0 probs)

11.2 limits (1 problem)

11.3 Partial Derivs (1 problem)

f_x, f_y, f_z ...etc.

11.4 Local Linear Approx (1 prob) ≡ Error Prop.

$w = f(x,y,z)$

$\Delta w \approx dw = f_x\,dx + f_y\,dy + f_z\,dz$

11.5 Chain Rule / Implicit Deriv

(1 prob) $f(x,y,z)$ $x(s)$ $y(s)$ $z(s)$

$$\frac{df}{ds} = f_x \frac{dx}{ds} + f_y \frac{dy}{ds} + f_z \frac{dz}{ds}$$

11.6 $D_u f = \nabla f \cdot \vec{u}$ ← unit vector (1 prob)

11.7 / 11.8 Extrema: ① Criticals (Find them)

② Lagrange's Method

Extra credit.

extra Credit

p. 657

pick #34 or #35